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## CROWN CAP

### Technical field

The invention relates to corking means for containers, particularly it relates to bottles crown caps with lines of weakness, tearing-strips and tags.

### Background Art

Different designs of crown caps for corking bottles are known, which made as a tin cap with a crowned skirt and provided with a tearing-tag which allows to uncork a corked bottle easy by means of removing a part of a back and the crowned skirt, which overlaps a neck of the corked bottle, along a line of weakness. As a rule, an elastic round laying is inserted inside the crown cap.

A number of designs stipulates a flat tearing tag which is made as a plate having an opening thereon and fixed to the back outside of the crown cap by means of a rivet, and the plate serves as a bending tag and doesn't exceed overall dimensions of the back. The plate can be formed as a simmetrical elongated tongue having a demicircular opening for a finger [patent CN 2090364U, 1992] or as a trapezium having the rounded corners [patent CN 2237607Y, 1996] or as an oval [patents CN 2115979U, 1993; CN 2090367U, 1992].

Known crown cap is choosen as a prototype of first three offered variants, it is provided with a round plate having the external diameter, which doesn't exceed diameter of a back of the crown cap, and laying on an outer surface of the back, where the round plate is connected to the back by means of a rivet and has an opening which is made to form a ring-shaped tab when the edge of the round plate is turning up [publication WO 00/51906, 2000].

Abovementioned crown caps having separate plate-tags have low ergonomic properties as follows:

- a) the plate is made by means of punching therefore its edge may be sharp or have agnails that may wound the user;
- b) during transportation of the corked bottle the plate may turn around the rivet and leave for dimensions of the back of the crown cap by means of a casual external force that may result in involuntary uncorking, in particular under action of other casual external force;
- c) there is a small opening for a finger of large men in designs with elongated tags because diameter of standard crown caps is rather small.

Accordingly other designs it is a tearing tag which is formed as a part of a whole back of a crown cap, and the tag is bent and then torn off together with a part of a crowned skirt during

uncorking [for example, patent application CN 1043678A, 1990]. As a prototype of fourth offered variant it is chosen known crown cap which is made as a cap with a crowned skirt, and a round-shaped tag having a round-shaped opening for finger is formed on its back [patent CN2221558Y, 1996]. It is possible to separate the tag from the crown cap back along a nonclosed external generatrix whose ends are connected smoothly with lines of weakness forming a tearing strip having a width no more than greatest traversal size of the tag. An elastic round laying corresponding to diameter of a corking bottle neck is inserted inside the crown cap. Deficiencies of the known crown cap are connected to the following:

- a) the cross-section of the ring-shaped tag has a small rigidity therefore the user may pinch a finger during uncorking;
- b) tearing of the tag from the back along lines of weakness is connected with significant efforts;
- c) the elastic laying may be damaged through an excision by means of an external action.

Accordingly other group of designs a crown cap also is made from a sheet material as a cap with a crowned skirt, but a tag is made as a strip entirely with the crown cap, and one end of the strip is provided with a ring-shaped tag having and other end of the strip is conjugated with periphery edge of the crowned skirt. For example, it is known crown cap which is provided with two lines of weakness made on the crown cap, these lines begin from places of the conjunction of the strip with the periphery edge of the crowned skirt with forming a tearing strip [patent GB1139247, 1969]. Both the tag and the strip considerably support overall dimensions of the cap that creates technological difficulties during transportation of manufactured caps and corking bottles and also augments probability of involuntary uncorking of the corked bottle from a casual exposure. Also the possibility of involuntary uncorking the corked bottle by means of casual external action is increased.

As a prototype of fifth offered variant it is chosen known crown cap having a strip bent so, that one part of the strip lays on an outer surface of a crowned skirt and other part of the strip lays on an outer surface of the crown cap back [patent CN2205361Y, 1995]. Two lines of weakness made on the crown cap, these lines begin from places of conjunction of the strip with the periphery edge of the crowned skirt with forming a tearing strip. There are some deficiencies of the known crown cap as follows:

- a) the ring-shaped tag extends above a surface of the crown cap back therefore, at first, possibility of involuntary uncorking of the corked bottle from a casual exposure is increased, and

second, possibility of the interengagement between crown caps of corked bottles during transportation and storage is increased too;

b) strong materials, for example steel, are used for manufacture of crown caps having bent strips because the strip may burst in places of bends if it will be used materials having rather small durability, for example aluminum alloys, however significant efforts for tearing the tearing strip along the lines of weakness are necessary during uncorking when strong materials are used;

c) the crown cap is made by means of punching therefore its edge may be sharp or have agnails that may wound the user.

#### Disclosure of the Invention

It is a primary object of the present invention to improve the ergonomic properties of crown caps provided with strips detachable with the aid of a bending tag thereof, more specifically to increase the usability and safety of the caps. It is another object to reduce the possibility of self-uncorking of said easy-open crown caps and the interengagement therebetween during transportation and storage of corked bottles.

Abovementioned objects are solved by means of five offered variants of crown caps for corking bottles.

Common features for first three variants are that a crown cap is made as a cap with a crowned skirt and provided with a plate which carries out function of a bending tag and lays on an outer surface of a back of the crown cap, doesn't exceeding overall dimensions of the crown cap back, and which is fixed to the crown cap back by means of a rivet and has an opening therein. A line of weakness is made on the crown cap, it begins from periphery edge of the crown skirt and comes to the periphery edge with forming a tearing strip having a hole for the rivet therein. Common new feature for these three variants is that a length of an arc of the tearing strip from the beginning of the line of weakness up to its extremity does not exceed  $\pi/2$  radian, that allows to detach the tearing strip without great efforts. Also other common new feature for these variants is that it may be an elastic round laying corresponding to diameter of a corking bottle neck which is inserted inside the crown cap.

Also the new feature for the first variant is that at least a part of edge of the plate and/or the opening is spinned in, and besides the plate lays on the outer surface of the back of the crown cap by its side which the edge bent by spinning in is located on, that excludes possibility of wound of the user. Since the height of the location of top of the plate in this case is

augmented by thickness of the plate it may be a dint in it for the head of the rivet, and in case the height of this head is no more than the size of the dint it is excluded the engagement or wound of the user by the head of the rivet or its edges.

The new feature for the second variant is that it is at least one tongue made on an outer surface of the crown cap back and inserted into the opening in the plate to come into contact with an edge of the opening. This tongue excludes possibility of rotation of the plate around of the rivet and its getting out overall dimensions of the crown cap back (in case when the centre of the rivet is distinct from the centre of a circle of the crown cap back). From the point of view of manufacturing techniques (as punching) it is better to make this tongue having a spherical form. Also it is better when the height of the tongue does not exceed thickness of the plate.

Accordingly the third variant it is a plate which is round as in the prototype, its external diameter does not exceed diameter of the crown cap back, and the opening is executed so to make a ring-shaped tab when the edge of the round plate is bending up. Except for the above mentioned length of an arc of the tearing strip, the new features are that the opening has a ring nonclosed shape and is symmetric in relation to a diametrical axis of the round plate, and besides the hole for the rivet is located on said diametrical axis so, that it is in a segment of the round plate in which there is no the ring-shaped opening. Thus the crown cap may be removed from the bottle neck with using both the external ring-shaped tab and/or the internal tag having the shape of a part of a circle and formed along internal diameter of the opening.

It is better when a length of an arc of the ring-shaped opening is  $\pi \dots 11\pi/6$  radian, and/or the centre of the ring-shaped opening coincides with the centre of the round plate, and/or the ring-shaped opening has the sizes relatively of external diameter of the round plate as follows: external diameter - 0,5...0,9, internal diameter - 0,4...0,85.

It is better to make at least one spherical tongue on an outer surface of the crown cap back which is inserted into the opening as for the second variant.

It is better when there are gettings made in the ends of the ring-shaped opening on the side of its internal diameter that facilitates a bending of one of the tags, for example the ends of the ring-shaped opening may be rounded, and diameter of these rounds is more than width of the ring-shaped opening. In this case, the internal tag is bent more easy if external diameter of the ring-shaped opening conjugates with rounds smoothly.

Also a crown cap may be made by a combination of any two or all three abovementioned variants.

Accordingly the fourth variant it is a crown cap for corking bottles which is made as a cap with a crowned skirt and provided with a round-shaped tag formed on a back of the crown cap entirely with it and having a round-shaped opening for finger therein. It is possible to separate the tag from the back along a nonclosed external generatrix whose ends are connected smoothly with non-intersecting lines of weakness which are ended on a periphery edge of the crowned skirt with forming a tearing strip having a width no more than greatest traversal size of the tag. An elastic round laying corresponding to diameter of a corking bottle neck is inserted inside the crown cap. The new features are that a rigid round laying corresponding to diameter of the corking bottle neck is in addition inserted inside the crown cap before the elastic laying, and besides each of said layings has a plate-shaped form and is made with a recess opposite the opening, and also the tag is separated from the crown cap back by means of a slit located along the nonclosed external generatrix. The rigid laying, for example made of metal or plastic, does not allow to break through the fragile elastic laying casually, and the recess in it and the slit in the back allow to hitch the tag by the finger and to bend it easily.

The rigidity of the tag, excluding its curving and pinching the finger at use, may be increased by using a stiffening rib made on the tag and located between edge of the opening and the nonclosed external generatrix, so convexity of the stiffening rib may be directed downwards or upwards. Also both the rigidity and safety of use may be increased when at least a part of edge of the opening is spinned in to inside of the crown cap.

It is better when the tag with the opening as well as the tearing strip is symmetric in relation to a diametrical axis of the crown cap back. And the opening may be made in the form of an oval so that the greatest size of the oval is on a line which is perpendicular to axes of a symmetry of the tag, and the nonclosed external generatrix is equidistant to the oval generatrix so that distance between its extremities is less than the greatest size of the oval. The rigid round laying may have an open excision formed as a truncated sector, in this case lateral sides of the sector are coincided approximately with the lines of weakness of the crown cap.

Accordingly the fifth variant it is a crown cap for corking bottles which is made from a sheet material as a cap with a crowned skirt entirely with a tag-strip, that one end of the tag-strip is provided with a tag having an opening for finger and other end of the tag-strip is conjugated with periphery edge of the crowned skirt. The tag-strip is bent so, that one its part lays on an outer surface of the crowned skirt and other part of the tag-strip lays on an outer surface of the crown cap back. Two lines of weakness are made on the crown cap, they begin from places of

the conjunction of the tag-strip with the periphery edge of the crowned skirt, with forming a tearing strip. The new features are that it is the plate-shaped recess made on the crown cap back, the center of the plate-shaped recess coincides with the centre of a circle of the crown cap back, diameter of the plate-shaped recess is no more than internal diameter of a neck of a corked bottle and not less than diameter of circumscribing circle of the external generatrix of the tag, and the tag lays on the outer surface of the crown cap back in the place of the plate-shaped recess and does not extend over the external sizes of the plate-shaped recess. Thus the tag extends above a surface of the crown cap back less, and also the tag is in addition fixed by lateral walls of the plate-shaped recess that reduces the possibility of self-uncorking by means of a casual external force and the coupling with other subjects during transportation and storage.

It may be a round- or ring-shaped elastic laying corresponding to diameter of a corking bottle neck, which is inserted inside the crown cap.

It is better when the tag with the opening as well as the tearing strip is symmetric in relation to a diametrical axis of the crown cap back.

It is better when the tag has round-shaped form.

The plate-shaped recess may be made round on a plan view.

It is better when depth of the plate-shaped recess is approximately equal to thickness of the sheet material.

The lines of weakness may form the tearing strip which is symmetric in relation to a diametrical axis of the crown cap back (narrowed, extending or with equal width).

It is better for easy-uncorking when stress concentrators are made in the places of the conjunction of the tag-strip with the periphery edge of the crowned skirt (as recesses, excisions etc.).

It is better for corking technologically when the part of the tag-strip laying on the outer surface of the crowned skirt is equidistant to this outer surface (other words it is crowned too).

It is more safe at use when at least a part of edge of the opening for the finger or a generatrix of this opening is spinned in. Also it serves as a stiffening rib and excludes pinching the finger. The bending rigidity of the tag may be increased by means of a separate stiffening rib made on the tag and located between the external generatrix of the tag and edge of the opening for the finger.

The term "line of weakness" by all five variants may mean a continuous line as well a dash line, for example which is made by punching with flturning, other words by decrease of thickness of the sheet material of the crown cap.

#### Brief description of the figures on the drawings

The invention is described with reference to the accompanying drawings.

Fig.1-3 show a crown cap having a separate combined tag: Fig.1 is its top plan view, Fig.2 is its increased vertical cross-sectional view taken along the line *A-A* of Fig.1, Fig.3 is its increased local side view *I* of Fig.2.

Fig.4-7 show a crown cap having an incorporated tag: Fig.4 is its top plan view, Fig.5 is its local cross-sectional view taken along the line *B-B* of Fig.4, Fig.6 is its increased vertical cross-sectional view taken along the line *C-C* of Fig.4, Fig.7 is a top plan view of a probable embodiment of its rigid laying assembled with its elastic laying.

Fig.8-10 show a crown cap having a bent tag-strip: Fig.8 is its top plan view, Fig.9 is its increased vertical cross-sectional view taken along the line *D-D* of Fig.8, Fig.10 is its side elevational view *E* of Fig.9.

Lines of weakness on Fig.1, 2, 4, 8, 10 are shown by dotted lines.

#### The Example for Carrying out the Invention

Example 1. A crown cap having a separate combined tag.

The crown cap having a line 1 of weakness forming a tearing strip 2 includes a crowned skirt 3 and a back 4 having two spherical tongues 5 thereon. An elastic round laying 6 is inserted inside the crown cap, a round plate 8 including both a ring-shaped tab 9 and a demicircular tag 10 is fixed outside by a rivet 7, and both the tab 9 and tag 10 are formed by a opening 11 having rounded gettings 12. Edges 13, 14, 15 of the plate 8 are spinned in with obtaining a bending 16. Heads of the rivet 7 are located into dints 17, 18 made in the plate 8 and the back 4 respectively.

The crown cap may be removed from a corked bottle by means of two methods – by bending the tab 9 with its further hitching by one finger or by bending tag 10 with its further locking by two fingers, and then the strip 2 is tearing along the line 1.

Example 2. A crown cap having an incorporated tag.

The crown cap having lines 19 of weakness forming a tearing strip 20 includes a crowned skirt 21 and a back 22 having a tag 24 formed by means of both a slit 23 and an oval opening and having a convex stiffening rib as shown on Fig.5. Both an elastic round laying 25 and a rigid laying 26 having a plate-shaped form are inserted inside the crown cap, and laying 26

has a recess formed by both a flat bottom 27 and slant walls 28, a bent edge 29 fixing the laying 25. The laying 26 may have an open excision formed as a truncated sector as shown on Fig.7. Material of the laying 26 is sheet metal or rather strong plastic. Sharp edges of the tag 24 may be spinned in as shown on Fig.3.

For uncorking the tag 24 is bent up by a finger and then removed from the crown cap together with the strip 20 along the lines 19.

Example 3. A crown cap having a bent tag-strip.

The crown cap having lines 30, 31 of weakness forming a tearing strip 32 includes a crowned skirt 33 and a back 34 having a plate-shaped recess 35 having a depth of the plate-shaped recess 35 which is approximately equal to thickness of sheet metal which is used for punching the crown cap. An elastic round laying 36 is inserted inside the crown cap, and a ring-shaped tag 37 having a spinned edge 38, 39 is located outside and coupled with the crown skirt 33 by means of a strip 40. The strip 40 has bends 41, 42, and its lower part 43 has a crowned groove and is equidistant to a crowned groove of the skirt 33. Gettings 44, 45 functioning as stress concentrators are made in the places of the conjunction of the strip 40 with the skirt 33 wherein the lines 30, 31 are beginning.

For uncorking the tag 37 is preliminary bent up, then it is hitched by one finger and pulled upwards-apart, thus the strip 32 is torn from the crown cap along the lines 30, 31 from the gettings 44, 45.

The crown cap by all three examples may be made by punching of the varnished lithographic sheet metal (it is better to use white sheet metal). The elastic layings may be made of a cardboard or a fuse, or they are formed of BX-plastisol, BX-granulate or polyethylene by express technology. Express adhesion varnishes are used for last three types, and choice is determined by type of the material.